

FY	Qtr	A11A31	M10S	M11S	M12S	M13S	M14S	M15S	M16S	M17S	M1S	M3S	M4D	M6S	M7S	OW-2	RWMC Prod	USGS- 127
1997	1																	
	2																	
	3										1.4			1.0				
	4																	
1998	1																	
	2																	
	3																	
	4																	
1999	1																	
	2																	
	3																	
	4																	
2000	1																	
	2																	
	3									35								
	4																	
2001	1																	
	2																	
	3																	
	4																	
2002	1																	
	2																	
	3														1.2			
	4																	
		Analysis performed but Tc-99 not detected.																
		Tc-99 detected (pCi/L).																
Key		If more than one positive detection occurred in a single quarter, then only the highest concentration is listed.																
		MCL = 900 pCi/L																
		MCL - maximum contaminant level																

Figure 3-27. Occurrences of technetium-99 in aquifer samples collected in the vicinity of the Radioactive Waste Management Complex since FY 1997.

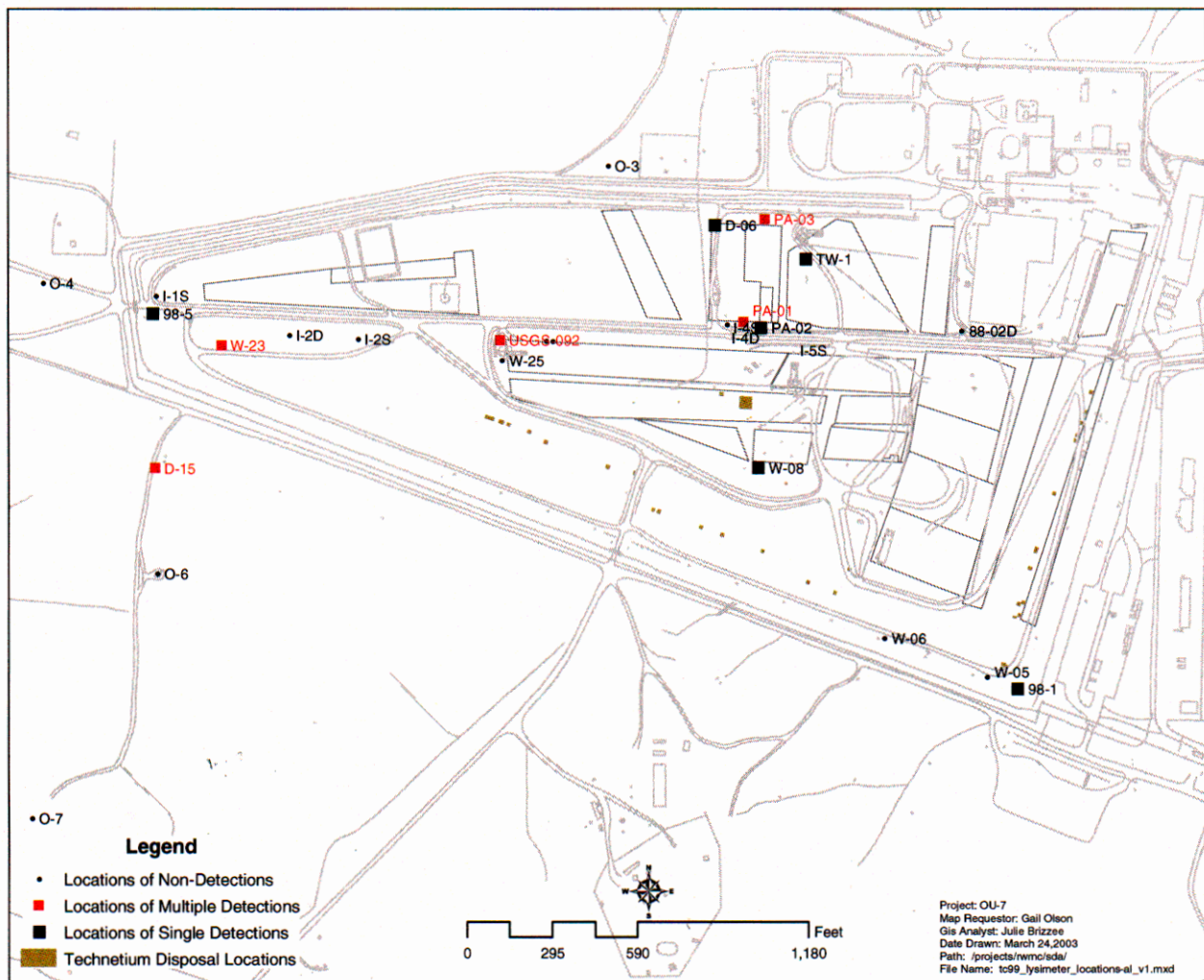


Figure 3-28. Disposals and vadose zone detections of technetium-99.

3.10 Uranium

Uranium occurs naturally in the environment and also is processed and handled for use in nuclear weapons and reactors. Because several isotopes are naturally occurring, it is necessary to differentiate background concentrations from anthropogenic uranium. Background concentrations for U-234, U-235/236, and U-238 in the aquifer beneath the RWMC are 2.0, 0.12, and 0.93 pCi/L, respectively (Leecaster, Koeppen, and Olson 2002 draft). Background concentrations in the soil moisture are estimated to be 3.0, 0.5, and 1.5 pCi/L based on the mean values of 17 lysimeter samples collected at background locations. The background locations are outside of the SDA fences and are not expected to be impacted by disposed of waste.

Ratios of uranium isotopes also are expected to remain within a certain range when the uranium is naturally occurring. The U-238:U-235 activity ratio for natural uranium is 21.7. The U-238:U-235 activity ratio for slightly enriched (2%) uranium is approximately 8, and approximately 0.01 for highly enriched (greater than 93%) uranium.

3.10.1 Waste Zone

Two waste zone soil moisture samples were collected in FY 2002 and analyzed for uranium, with significant concentrations detected in both samples (see Table 3-18). Samples were collected from Lysimeter 741-08-L1, which is located in the Americium/Neptunium Focus Area of Pit 10. All of the uranium results reported in Table 3-18 exceed local soil moisture backgrounds and 1E-05 RBC for the aquifer.

Uranium analyses were performed by alpha spectrometry. Generally, U-235 and U-236 cannot be discriminated using alpha spectrometry because the alpha energy peaks are nearly identical; however, for the November 2001 sample, the analytical and measurement conditions were optimal, and the analyst was able to discriminate and quantify U-235 and U-236.

Uranium detections from Lysimeter 741-08-L1 are substantiated by (1) results from the laboratory-generated duplicate, which contained similar uranium concentrations, (2) comparable results from samples collected in November 2001 and April 2002, and (3) shipping records, which show that highly enriched uranium waste from weapons manufacturing was disposed of at this location. The U-238:U-235 ratios associated with both sampling events, as well as the presence of U-236, indicate the source of uranium to be anthropogenic, with a slight U-235 enrichment. The measured uranium results approach the solubility limits for uranium in a solution with pH between 7 and 8 and log [O₂] between 10 and 50.

Lysimeter 741-08-L1 also was sampled in April 2002; however, the sample volume was insufficient to perform isotopic uranium analyses.

Table 3-18. Isotopic uranium detections above local soil moisture background in Subsurface Disposal Area waste zone soil moisture samples.

Lysimeter Depth at 15.2 ft	Sample Date	Sample Volume (mL)	Radionuclide	Sample Concentration $\pm 1\sigma$ (pCi/L) ^a	MDA ^b (pCi/L)	Soil Moisture Background ^c (pCi/L)	RBC ^d (pCi/L)	Limitations and Validation Report Identifier
741-08-L1	11/7/01	~15	U-233/234	1,800 \pm 186	25	3.0	6.7	DNT-60-02
			U-235	42 \pm 12_J	19	0.5	6.6	DNT-60-02
			U-236	91 \pm 20_J	18	0	7.1	DNT-60-02
			U-238	291 \pm 47	14	1.5	5.5	DNT-60-02
741-08-L1	8/21/02	~20	U-233/234	1,770 \pm 274_J	16	3.0	6.7	SOS-019-02
			U-235/236	156 \pm 32_J	14	0.5	6.6	SOS-019-02
			U-238	348 \pm 66_J	11	1.5	5.5	SOS-019-02

a. Red bold font indicates a sample concentration exceeding the 1E-05 RBC. Concentrations with a "J" subscript are positive detections with an assigned "J" data qualifier flag. The "J" qualifier flag was assigned to the November 2001 result because of limitations associated with discriminating and quantifying U-235 and U-236 using alpha spectrometry. The April 2002 data was flagged "J" because a contractually required duplicate analysis could not be performed to confirm the detection, because of insufficient sample volume. Therefore, the reported concentrations of the "J" qualified results should only be used as estimated quantities.

b. The MDA is commonly referred to as the detection limit and is unique to each individual sample analysis result.

c. Local soil moisture background concentrations for uranium isotopes are averages of approximately 17 results obtained from 1998 to 2002 in the "O" wells and Well D15 outside of the SDA.

d. The RBC for the aquifer does not apply to soil moisture samples, and is provided only as a basis for comparison.

MDA = minimum detectable activity
RBC = 1E-05 risk-based concentration
SDA = Subsurface Disposal Area

3.10.2 Vadose Zone

3.10.2.1 Lysimeter Samples at Depths of 0 to 35 ft. Nine soil moisture samples were obtained from the shallow vadose zone (i.e., 0 to 35 ft) and analyzed for U-233/234, U-235/236 and U-238 in FY 2002. Five samples were collected in April 2002 from Lysimeters PA01-L15, W06-L27, W09-L23, W25-L28 and 98-4L38, and four samples were collected in September 2002 from Lysimeters PA01-L15, W23-L07, W23-L09, and W25-L28. Twenty-seven isotopic uranium results were generated from the nine soil moisture samples. Of the 27 results, 19 were above local soil moisture background, and 12 of the 19 exceeded the 1E-05 RBC for drinking water. The results above local soil moisture background concentrations are summarized in Table 3-19. Results since FY 1997 from select lysimeters are depicted in Figure 3-29a for U-233/234, Figure 3-29b for U-235/236, and Figure 3-29c for U-238.

The U-235/236 concentrations in W23-L09 appear to be steadily increasing (see Figure 3-29b). Well W23 is located on the west end of the SDA near some of the oldest disposals. Well W23 was installed in 1985 and contains Lysimeters L07, L08, and L09, located at depths of 5.7, 3.6, and 2.3 m (18.8, 11.8, and 7.7 ft), respectively. A soil moisture sample was collected for the first time in July 2002 from the 5.7-m (18.8-ft) deep Lysimeter W23-L07. Uranium concentrations in Lysimeter W23-L07 are considerably above local soil moisture background, which is expected because uranium concentrations previously observed in the shallower lysimeters (i.e., Lysimeters W23-L08 and W23-L09) also are quite elevated. However, the uranium data acquired in July 2002 is perplexing because the U-233/234 and U-238 concentrations and trends at the 2.3 m (7.7 ft) depth (Lysimeter W23-L09) have dramatically

Table 3-19. Isotopic uranium results above local soil moisture background in the 0 to 35-ft depth interval.

Lysimeter	Depth (ft)	Sample Date	Sample Volume (mL)	Radionuclide	Sample Concentration $\pm 1\sigma$ (pCi/L) ^a	Minimum Detectable Activity ^b (pCi/L)	Soil Moisture Background ^c (pCi/L)	Risk-Based Concentration ^d (pCi/L)	Limitations and Validation Report Identifier
PA01-L15	14.3	4/25/02	~375	U-233/234 U-238	25 ± 3	0.3	3.0	6.7	DNT-168-02
					13.2 ± 1.6	0.9	1.5	5.5	DNT-168-02
W06-L27	12.0	4/25/02	~300	U-233/234 U-235/236	125 ± 10	0.7	3.0	6.7	DNT-168-02
					3.7 ± 0.6	0.5	0.5	6.6	DNT-168-02
W09-L23	14.8	4/25/02	~250	U-238	53 ± 4	0.7	1.5	5.5	DNT-168-02
					1.6 ± 0.5	0.4	1.5	5.5	DNT-168-02
W25-L28	15.5	4/25/02	~75	U-233/234 U-238	4.6 ± 0.9	1.0	3.0	6.7	DNT-168-02
					2.6 ± 0.6	0.7	1.5	5.5	DNT-168-02
PA01-L15	14.3	7/16/02	~850	U-233/234 U-235/236	37 ± 3	1.0	3.0	6.7	DNT-246-02
					3.3 ± 0.6	0.6	0.5	6.6	DNT-246-02
W23-L07	18.8	7/16/02	~700	U-238	20 ± 2	0.6	1.5	5.5	DNT-246-02
					68 ± 6	0.8	3.0	6.7	DNT-246-02
W23-L09	7.7	7/16/02	~500	U-233/234 U-235/236	10.2 ± 1.3	1.6	0.5	6.6	DNT-246-02
					40 ± 4	1.3	1.5	5.5	DNT-246-02
W25-L28	15.5	7/16/02	~800	U-233/234 U-238	38 ± 4	0.9	3.0	6.7	DNT-246-02
					6.1 ± 0.9	0.3	0.5	6.6	DNT-246-02
W25-L28	15.5	7/16/02	~800	U-238	23 ± 2	0.9	1.5	5.5	DNT-246-02
					5.7 ± 0.8	0.8	3.0	6.7	DNT-246-02
W25-L28	15.5	7/16/02	~800	U-238	2.5 ± 0.5	0.9	1.5	5.5	DNT-246-02

a. **Red bold font** indicates a sample concentration exceeding the 1E-05 RBC. **Black bold font** indicates a sample concentration less than the RBC, and greater than local soil moisture background concentrations (see footnote b).

b. The MDA is commonly referred to as the detection limit, and is a unique to each individual sample analysis result.

c. Local soil moisture background concentrations for uranium isotopes are averages of approximately 17 results obtained from 1998 through 2002 in the "O" wells and Well D15 outside of the SDA.

d. The RBCs for drinking water do not apply to soil moisture samples and are provided only as a basis for comparison.

MDA = minimum detectable activity

RBC = 1E-05 risk-based concentration

SDA = Subsurface Disposal Area

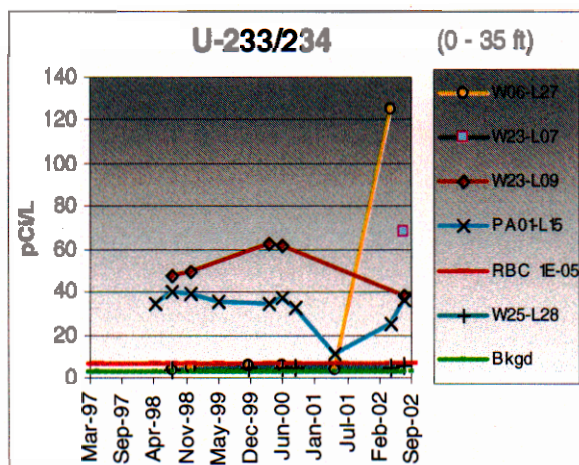


Figure 3-29a. Uranium-233/234 in select lysimeters from the shallow vadose zone, March 1997 through September 2002.

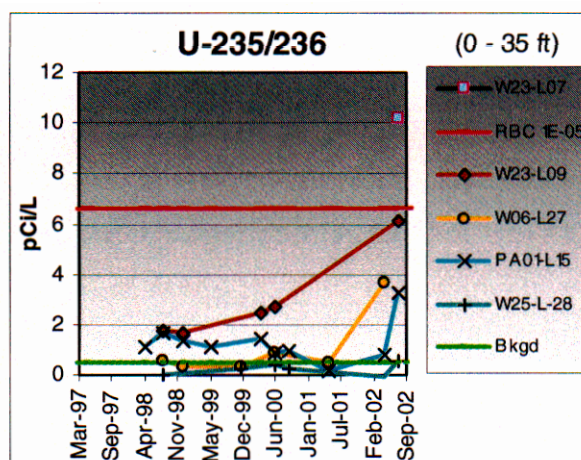


Figure 3-29b. Uranium-235/236 in select lysimeters from the shallow vadose zone, March 1997 through September 2002.

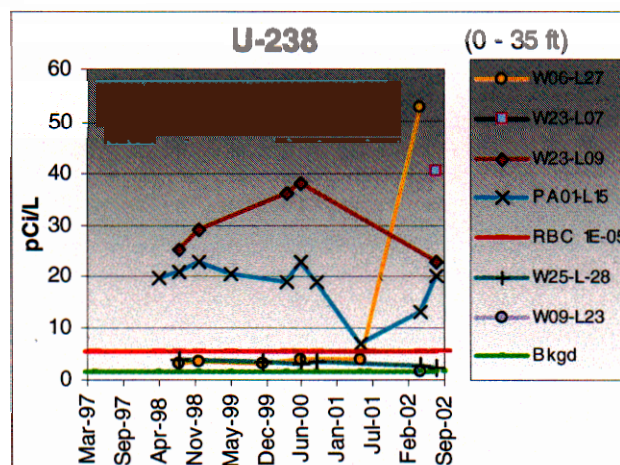


Figure 3-29c. Uranium-238 in select lysimeters from the shallow vadose zone, March 1997 through September 2002.

decreased, while the U-235/236 has noticeably increased. And at the 5.7 m (18.8 ft) depth (Lysimeter W23-L07), the concentrations of all the uranium isotopes are much higher than at the 2.3 m (7.7 ft) depth. It can only be conjectured why the isotopic concentrations and trends have changed with depth. Higher uranium concentrations at deeper levels could be indicative of several situations. For example, a uranium pulse may have passed through the shallow region and the higher concentrations are moving down. The detection also could indicate preferential flow or imply a dense cache of uranium-bearing waste nearby. Until additional uranium data can be obtained from this set of lysimeters, trends cannot be accurately assessed. Waste Area Group 7 plans to install Type B probes in the Well W23 area to provide additional information with which to further evaluate the movement and behavior of uranium isotopes.

3.10.2.1.1 Lysimeter Samples at Depths of 35 to 140 ft—Twelve soil moisture samples were obtained in FY 2002 from depths of 35 to 140 ft and analyzed for U-233/234, U-235/236, and U-238. Three samples were collected in April 2002 from Lysimeters I1S-DL09, I2S-DL11, and I4S-DL15, and nine samples were collected in July 2002 from Lysimeters D06-DL02, D15-DL06, I1S-DL09, I2S-DL11, I3S-DL13, I4S-DL15, O3-DL22, O4-DL24, and O5-DL25. Thirty-six isotopic uranium results were generated from the 12 soil moisture samples. Seventeen of the 36 results were above local soil moisture background, seven of which exceeded the 1E-05 RBC for drinking water. The results above local soil moisture background concentrations are summarized in Table 3-20. Historical data from select lysimeters from this depth range are plotted in Figures 3-30a for U-233/234, Figure 3-30b for U-235/236, and Figure 3-30c for U-238.

Table 3-20. Isotopic uranium results above local soil moisture background in the 35 to 140-ft depth interval.

Lysimeter	Depth (ft)	Sample Date	Sample Volume (mL)	Radionuclide	Sample Concentration $\pm 1\sigma$ (pCi/L) ^a	MDA ^b (pCi/L)	Soil Moisture Background ^c (pCi/L)	RBC ^d (pCi/L)	Limitations and Validation Report Identifier
I1S-DL09	101	4/24/02	~650	U-233/234	17.3 \pm 1.7	0.2	3.0	6.7	DNT-168-02
				U-238	9.4 \pm 1.1	0.7	1.5	5.5	DNT-168-02
I4S-DL15	98	4/25/02	~250	U-233/234	3.9 \pm 0.7	0.7	3.0	6.7	DNT-168-02
				U-238	1.7 \pm 0.4	0.5	1.5	5.5	DNT-168-02
D06-DL02	44	7/15/02	~500	U-233/234	96 \pm 8	0.8	3.0	6.7	DNT-246-02
				U-235/236	3.7 \pm 0.7	0.8	0.5	6.6	DNT-246-02
				U-238	42 \pm 4	0.8	1.5	5.5	DNT-246-02
D15-DL06	98	7/17/02	~300	U-233/234	6.0 \pm 1.8	4.8	3.0	6.7	DNT-246-02
I1S-DL09	101	7/15/02	~500	U-233/234	14.6 \pm 1.5	0.8	3.0	6.7	DNT-246-02
				U-235/236	2.6 \pm 0.5	0.2	0.5	6.6	DNT-246-02
				U-238	8.9 \pm 1.1	0.6	1.5	5.5	DNT-246-02
I4S-DL15	97	7/16/02	~450	U-233/234	8.6 \pm 1.2	1.2	3.0	6.7	DNT-246-02
				U-235/236	1.2 \pm 0.4	1.0	0.5	6.6	DNT-246-02
				U-238	3.6 \pm 0.7	0.8	1.5	5.5	DNT-246-02
O4S-DL24	109	7/17/02	~300	U-233/234	3.1 \pm 0.6	1.0	3.0	6.7	DNT-246-02
O5S-DL25	104	7/17/02	~500	U-233/234	4.2 \pm 0.6	0.7	3.0	6.7	DNT-246-02
				U-238	2.0 \pm 0.5	0.8	1.5	5.5	DNT-246-02

a. Red bold font indicates a sample concentration exceeding the 1E-05 RBC. Black bold font indicates a sample concentration less than the RBC and greater than local soil moisture background concentrations (see footnote b).

b. The MDA is commonly referred to as the detection limit, and is a unique to each individual sample analysis result.

c. Local soil moisture background concentrations for uranium isotopes are averages of approximately 17 results obtained from 1998 to 2002 in the "O" wells and Well D15 outside of the SDA.

d. The RBCs for drinking water do not apply to soil moisture samples and are provided only as a basis for comparison.

MDA = minimum detectable activity

RBC = 1E-05 risk-based concentration

SDA = Subsurface Disposal Area

Anthropogenic impacts are indicated in the mid-depth soil moisture near Pad A. Soil moisture samples collected from Well D06 show increasing amounts of U-233/234 and U-238, and the uranium ratios of samples from Well D06-DL02 indicate uranium that is enriched. As shown in Figure 3-31a, the U-238:U-235 ratio is trending downward because of increasing U-235 activity over time. Meanwhile, the U-234 activity and the U-234:U-238 activity ratio is increasing slightly over time (see Figure 3-31b). Although the U-234:U-238 ratios in Well D06-DL02 are still within the expected range for natural uranium, increasing U-234 coupled with increasing U-235 suggests that enriched uranium is impacting the soil moisture at this location (near Pad A). Trends are not apparent in lysimeters elsewhere in the SDA, although all uranium isotopes measured in Well I1S on the west end of the SDA are relatively high. Well I1S is located near Well W23, which yielded samples high in uranium from the shallow vadose zone.

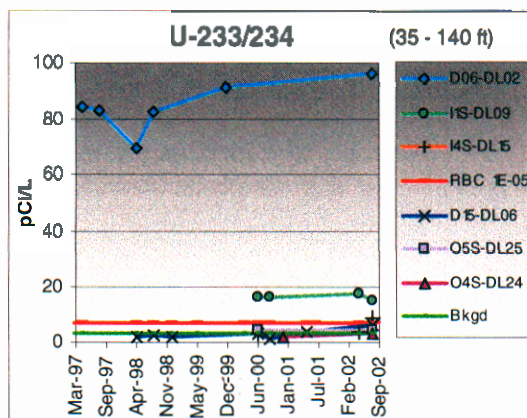


Figure 3-30a. Uranium-233/234 in mid-depth lysimeters, March 1997 through September 2002.

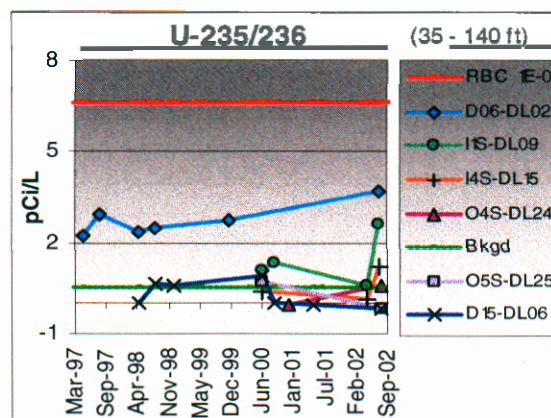


Figure 3-30b. Uranium-235/236 in mid-depth lysimeters, March 1997 through September 2002.

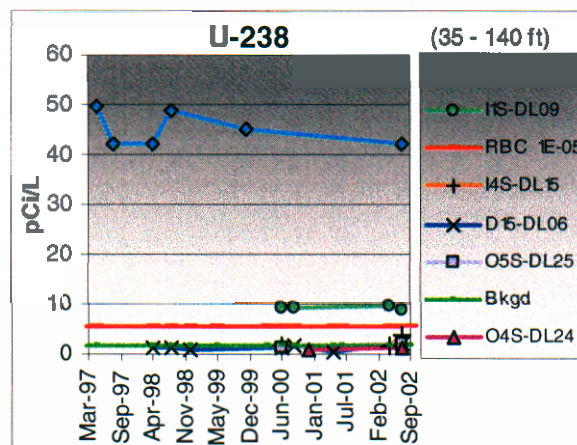


Figure 3-30c. Uranium-238 in mid-depth lysimeters, March 1997 through September 2002.

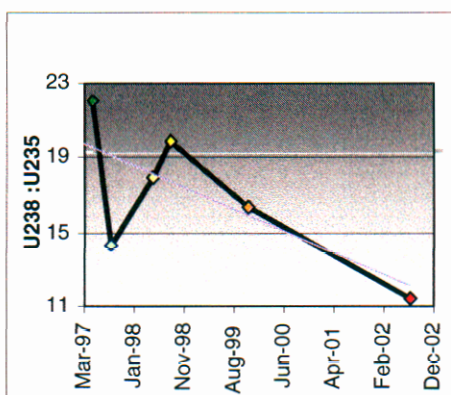


Figure 3-31a. Uranium-238/235 activity ratio in D06-DL02 over time.^e

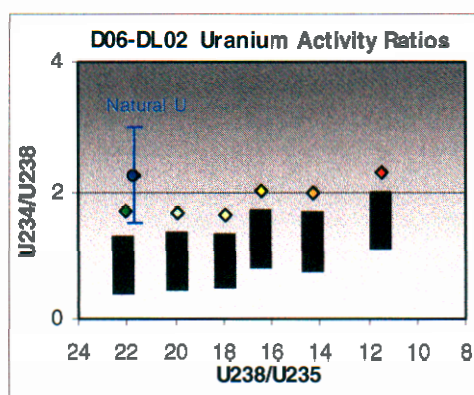


Figure 3-31b. Uranium-234/238 versus Uranium-238/235 activity ratios in Lysimeter D06-DL02.^f

3.10.2.2 Lysimeter and Perched-water Samples at Depths Greater than 140 ft. One perched water sample and seven soil moisture samples were obtained in FY 2002 from deeper than 140 ft and analyzed for U-233/234, U-235/236, and U-238. The perched water sample was collected from USGS-92 in January 2002. Four samples were collected in April 2002 from Lysimeters I2D-DL10, I3D-DL12, I4D-DL14, and O8-DL29. Three samples were collected in July 2002 from Lysimeters I3D-DL12, O6-DL26, and O7-DL27. Twenty-four isotopic uranium results were generated from the eight samples. Of the 24 results, two were above local soil moisture background, and none exceeded the 1E-05 RBC for drinking water. The results above local soil moisture background concentrations are summarized in Table 3-21. Historical U-233/234 and U-238 data from Well USGS-92 (65 m [214 ft] deep) are depicted in Figures 3-32a and 3-32b. Perched-water samples from Well USGS-92 often exceed background concentrations for U-233/234 and U-238; however, the data show no constant trends.

3.10.3 Aquifer

Sixty-three aquifer samples were collected in FY 2002 from 15 RWMC monitoring wells and analyzed for U-233/234, U-235/236, and U-238. All isotopic uranium concentrations were within concentration ranges typically observed in the SRPA, with the exception of two U-235/236 results. The U-235/236 concentration measured in the samples collected from monitoring Well M3S in December 2001 and Well OW2 in September 2002 was slightly above U-235 background levels in the SRPA (see Table 3-22). Samples were collected in November and December 2001, and February, May, and September 2002, from monitoring Wells AllA31, M1S, M3S, M4D, M6S, M7S, M11S, M12S, M13S, M14S, M15S, M16S, M17S, OW2, and USGS-127.

e. The declining ratio is because of an increasing concentration of U-235 in the lysimeter samples, suggesting anthropogenic impact to soil moisture.

f. The U-234:238 ratios are within the range of natural uranium, but are increasing over time, while U-238:U-235 ratios show indications of enriched uranium.

Table 3-21. Isotopic uranium results above local soil moisture background in the 140 to 250-ft depth interval.

Lysimeter at Depth of 214 ft	Sample Date	Sample Volume (mL)	Radionuclide	Sample Concentration $\pm 1\sigma$ (pCi/L) ^a	MDA ^b (pCi/L)	Soil Moisture Background ^c (pCi/L)	RBC ^d (pCi/L)	Limitations and Validation Report Identifier
USGS-92	1/15/02	500	U-233/234	3.8 ± 0.9	1.6	3.0	6.7	BAM-23-02
			U-238	3.2 ± 0.9	1.6	1.5	5.5	BAM-23-02

a. **Black bold font** indicates a sample concentration less than the RBC and greater than local soil moisture background concentrations (see footnote c).

b. The MDA is commonly referred to as the detection limit and is unique to each individual sample analysis result.

c. Local soil moisture background concentrations for uranium isotopes are averages of approximately 17 results obtained from 1998 through 2002 in the "O" wells and Well D15 outside of the SDA.

d. The RBCs for drinking water do not apply to soil moisture samples and are provided only as a basis for comparison.

MDA = minimum detectable activity

RBC = 1E-05 risk-based concentration

SDA = Subsurface Disposal Area

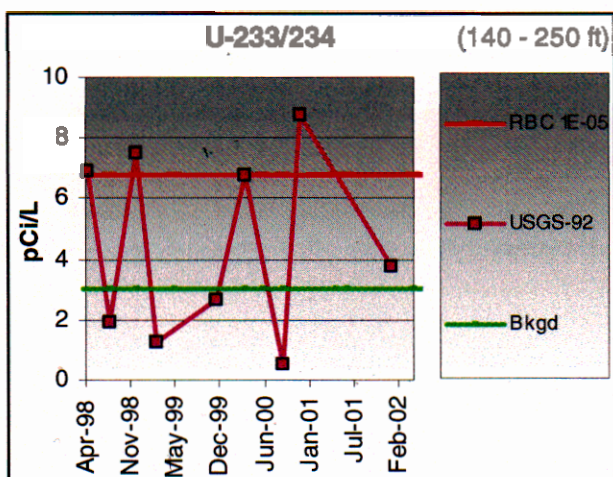


Figure 3-32a. Uranium-233/234 data from Well USGS-92, April 1998 through February 2002.

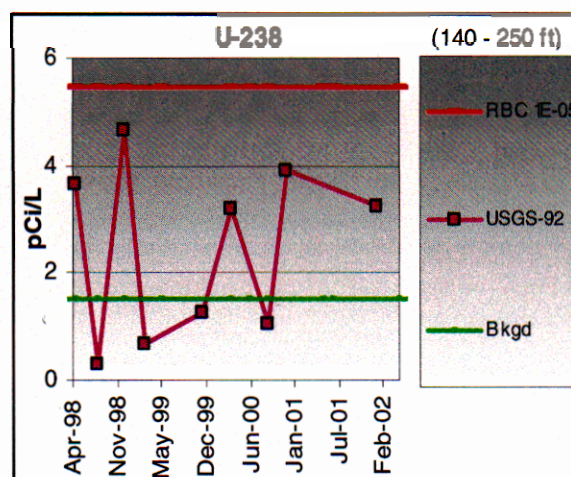


Figure 3-32b. Uranium-238 data from Well USGS-92, April 1998 through February 2002.

Table 3-22. Isotopic uranium results above aquifer background levels.

Well	Sample Date	Radionuclide	Detected Concentration $\pm 1\sigma$ (pCi/L) ^a	Reanalysis Result ^b $\pm 1\sigma$ (pCi/L)	MDA (pCi/L)	Aquifer Background ^c (pCi/L)	MCL ^d (pCi/L)	Sample Identifier ^e
M3S	12/5/01	U-235	0.14 \pm 0.03	Not applicable	0.04	0.00 to 0.11	27	RISM0301RH
OW2	9/17/02	U-235	0.18 \pm 0.03	Not applicable	0.04	0.00 to 0.11	27	RISN1401RH

a. **Black bold font** indicates sample concentrations that are less than the MCL, but greater than aquifer background concentrations (see footnote c).

b. A sample is reanalyzed if the analytical result for Am-241, Np-237, Pu-238, or Pu-239/240 is greater than its sample-specific minimum detectable activity and greater than two times its reported 1σ standard deviation. The reanalysis provides information necessary to help evaluate and confirm detections.

c. The SRPA background ranges were established by the USGS in 1992 from samples collected upgradient (i.e., Mud Lake area) and downgradient (i.e., Magic Valley area) of the INEEL (Knobel, Orr and Cecil 1992). The total uranium background concentration range measured by the U.S. Geological Survey (i.e., 0.01 to 7.0 ug/L) was converted to U-235 activity by using the natural U-235 abundance of 0.0055% and a specific activity of 2.14E-6 Ci/g.

d. The MCL applies to total alpha, not each individual uranium isotope.

e. The limitations and validation report identifier associated with the sample identifiers are DNT-031-02 (RISM0301RH) and SOS-TL04-02 (RISN1401RH).

INEEL = Idaho National Engineering and Environmental Laboratory

MDA = minimum detectable activity

MCL = maximum contaminant level

SRPA = Snake River Plain Aquifer

Uranium detected in the aquifer in the vicinity of the RWMC is typical of naturally occurring uranium in the SRPA. In FY 2002, elevated U-235/236 in aquifer Wells M3S and OW2 appear to be anomalous, because all other quarterly sampling results for FY 2002 show the U-235/236 to be representative of aquifer background concentrations. A summary of the maximum detected concentrations of U-233/234 and U-238 in aquifer samples since FY 1997 are presented in Tables 3-23 and 3-24, respectively.

3.10.4 Summary of Uranium

Uranium levels measured in FY 2002 in numerous waste zone and vadose zone soil moisture samples significantly exceed local soil moisture background levels and RBCs for water ingestion. The soil moisture detections of uranium above RBCs are depicted in Figure 3-33 with the locations of uranium disposals based on disposal records. Some locations are where multiple detections of uranium correlate with disposal locations, suggesting that uranium may be a potential candidate for model validation or comparison. In the Pad A area, uranium is detected above background levels in all lysimeters above 30 m (100 ft), but has not been repeatedly measured above background levels at Well I-4D (at 59 m [226.5 ft]). Most interesting is that uranium has been repeatedly detected above background in Well I-4 at the 29.6-m (97-ft) depth (Well I-4S), suggesting that uranium may have migrated to the first B-C interbed, but may not yet have reached the C-D interbed at 67 m (220 ft). Wells D06 and PA01 from the Pad A area routinely contain elevated uranium concentrations, and Well D06 data are indicative of enriched uranium.

Uranium trends also are occurring at the west end of the SDA; however, no uranium disposals have been recorded in that area. Therefore, the monitoring data cannot be correlated with modeling, which starts in the source term with the inventory records; however, the uranium trends in the western end of the SDA highlight some limitations and uncertainties of the inventory records. Soil moisture samples from some of the lysimeters at the western end of the SDA exhibit elevated uranium (e.g., Wells I-1S and W23), and increasing uranium trends over time. Historical uranium results from soil moisture samples from Well 98-5 in the western SDA have shown elevated and trending uranium concentrations. Isotopic uranium ratios at Well W23 are indicative of slightly enriched anthropogenic uranium. Recently, no adequate sample volumes have been obtained from these wells to permit uranium analyses.

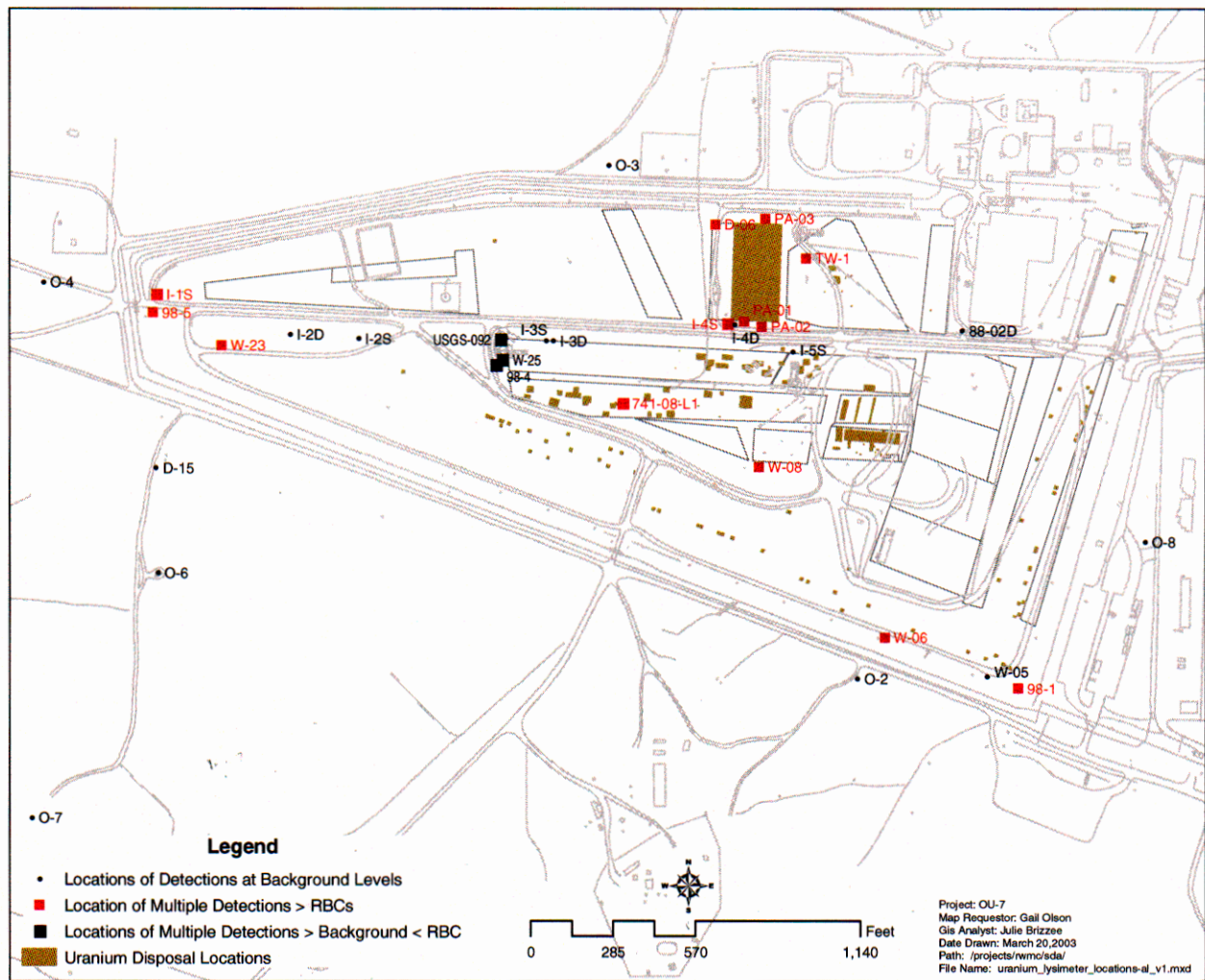


Figure 3-33. Uranium disposal locations and vadose zone detection locations at the Subsurface Disposal Area.

Table 3-23. Summary of maximum detected concentrations of uranium-233/234 from aquifer wells in the vicinity of the Radioactive Waste Management Complex since FY 1997.^a

Fiscal Year	Maximum Concentration $\pm 1\sigma$	Well Location
	(pCi/L)	
1997	NA ^(c)	—
1998	1.65 \pm 0.16	M3S
1999	1.54 \pm 0.13	M12S
2000	1.6 \pm 0.2	M14S
2001	4.3 \pm 0.4	M14S
2002	1.68 \pm 0.14	M4D

a. MCL = 27 pCi/L (total uranium).

b. Fiscal year spans from October 1 to September (e.g., October 1, 1996, to September 30, 1997, is FY 1997).

c. No samples were analyzed for U-233/234.

FY = fiscal year

MCL = maximum contaminant level

Table 3-24. Summary of maximum detected concentrations of uranium-238 from aquifer wells in the vicinity of the Radioactive Waste Management Complex since FY 1997.^a

Fiscal Year ^b	Maximum Concentration $\pm 1\sigma$ (pCi/L)	Well Location
1997	NA	—
1998	0.74 ± 0.08	M7S
1999	0.75 ± 0.07	M12S
2000	0.72 ± 0.11	M3S
2001	2.1 ± 0.2	M14S
2002	0.78 ± 0.08	M4D

a. MCL = 27 pCi/L (total uranium).

b. Fiscal year spans from October 1 to September (e.g., October 1, 1996, to September 30, 1997, is FY 1997)

c. Not analyzed.

FY = fiscal year

MCL = maximum contaminant level

3.11 Other Radionuclide Contaminants

All waste zone, vadose zone, and aquifer samples were analyzed for 20 or more gamma-emitting radionuclides, and there was only one detection. A positive detection of Cs-137 was reported in the third quarter aquifer sample pulled from Well M7S. No Cs-137 was detected in the subsequent quarter from the same well.